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Continuous rainfall simulation for regional flood risk assessment – application in the Austrian Alps

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Generation of realistic synthetic spatial rainfall is of pivotal importance for assessing regional hydroclimatic hazard as the input for long term rainfall-runoff simulations. The correct reproduction of the observed rainfall characteristics, such as regional intensity-duration-frequency curves, is necessary to adequately model the magnitude and frequency of the flood peaks. Furthermore, the replication of the observed rainfall spatial and temporal correlations allows to model important other hydrological features like antecedent soil moisture conditions before extreme rainfall events.

In this work, we present an application in the Tirol region (Austrian alps) of a modification of the model presented by *Bardossy and Platte (1992)*, where precipitation is modeled on a station basis as a mutivariate autoregressive model (mAr) in a Normal space, and then transformed to a Gamma-distributed space. For the sake of simplicity, the parameters of the Gamma distributions are assumed to vary monthly according to a sinusoidal function, and are calibrated trying to simultaneously reproduce i) mean annual rainfall, ii) mean daily rainfall amounts, iii) standard deviations of daily rainfall amounts, and iv) 24-hours intensity duration frequency curve. The calibration of the spatial and temporal correlation parameters is performed in a way that the intensity-duration-frequency curves aggregated at different spatial and temporal scales reproduce the measured ones.

Bardossy, A., and E. J. Plate (1992), Space-time model for daily rainfall using atmospheric circulation patterns, Water Resour. Res., 28(5), 1247–1259, doi:10.1029/91WR02589.